

## 06.0 MANUFACTURING SYSTEMS II

**Prerequisites:** Fundamentals of Technology  
Manufacturing Systems I

Manufacturing Systems II continues to build on the knowledge and skills gained from Manufacturing Systems I. Students pursue more detailed and integrated manufacturing and production projects. Students continue to use creative problem solving skills, design tools and processes, and apply manufacturing techniques with increasing sophistication. Projects are designed and produced using computer-assisted manufacturing applications, computer numerically-controlled machines and robotics. This course has been developed for students pursuing careers in manufacturing as a designer, drafter, industrial manager, technician or engineer.

PROGRAM TASK LISTING EFFECTIVE DATE: June 30, 1995

PROGRAM AREA: Technology Education

PROGRAM TITLE: Manufacturing Systems II

IDAHO CODE NUMBER: TE 1932

- 06.01 Describe the types of manufacturing systems.
- 06.02 Discuss the implications of people: The most important resource.
- 06.03 Apply basic skills in communications, mathematics, and science appropriate to technological content and learning activities.
- 06.04 Demonstrate knowledge of manufacturing materials.
- 06.05 Demonstrate knowledge of prototype design engineering processes.
- 06.06 Demonstrate knowledge of tools and machines used in manufacturing systems.
- 06.07 Demonstrate knowledge of the finances of manufacturing.
- 06.08 Demonstrate knowledge of production engineering processes.
- 06.09 Demonstrate knowledge of organization, ownership and management systems.
- 06.10 Demonstrate knowledge of processing materials.
- 06.11 Demonstrate knowledge of marketing processes.
- 06.12 Demonstrate knowledge of financial processes.

06.13 Demonstrate knowledge of manufactured goods.

06.14 Discuss the relationship of scrap, waste, pollution and recyclability.

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06.01 DESCRIBE THE TYPES OF MANUFACTURING SYSTEMS--

The student will be able to:

1. Distinguish between the various manufacturing systems.
2. Select which system is appropriate for a specific product.
3. Demonstrate, appraise and manage a continuous manufacturing system.

06.02 DISCUSS THE IMPLICATIONS OF PEOPLE: THE MOST IMPORTANT RESOURCE--

The student will be able to:

1. Explain why people are the most important resource in a manufacturing system.
2. Identify guidelines for the hiring of people for manufacturing.
3. Describe methods of protecting people in the manufacturing workplace.
4. Design and complete a job-application-form for a specific job within a manufacturing system.

06.03 APPLY BASIC SKILLS IN COMMUNICATIONS, MATHEMATICS, AND SCIENCE APPROPRIATE TO TECHNOLOGICAL CONTENT AND LEARNING ACTIVITIES--

The student will be able to:

1. Use the features of books and reference materials, such as table of contents, preface, introduction, titles and subtitles, index, glossary, appendix, and bibliography.
2. Read and follow complex written directions.
3. Find, understand, and apply information from a variety of sources (books, manuals, newspapers, periodicals, directories, reference works, computer printouts, and other printed matter or electronic sources such as video display terminals).
4. Use and expand general and specialized vocabulary (including abbreviations, acronyms, and concepts) as appropriate to subject areas studied at the grade level.

5. Write Standard English sentences with correct:
  - sentence structure;
  - verb forms;
  - punctuation, capitalization, possessives, plural forms, and other matters of mechanics;
  - word choice and spelling.
6. Answer and ask questions coherently and concisely, and follow spoken instructions.
7. Identify and comprehend the main and subordinate ideas in lectures and discussions, ask questions to clarify information heard, and report accurately what others have said.
8. Perform with accuracy the computations of addition, subtraction, multiplication, and division using natural numbers, fractions, decimals, and integers.
9. Make and use measurements in both traditional and metric units.
10. Formulate and solve problems in mathematical terms, selecting appropriate approaches and tools (mental computation, trial and error, paper-and-pencil techniques, calculator, and computer).
11. Solve work-related problems involving the basic arithmetic operations using whole numbers, fractions, decimals, and percents.
12. Describe the role of observation and experimentation in the development of scientific theories.
13. Gather scientific information through skills in laboratory, field, and library work.
14. Draw conclusions or make inferences from data.
15. Apply basic scientific/technical solutions to the appropriate problems.

#### 06.04 DEMONSTRATE KNOWLEDGE OF MANUFACTURING MATERIALS--

The student will be able to:

1. Define and identify five basic manufacturing materials.
2. Describe the primary manufacturing process involved in the production of a common raw material to the completed product.
3. Evaluate the mechanical, chemical, thermal and electrical properties of a selected material.
4. Distinguish between the classifications of metallic, ferrous, nonferrous, polymeric, ceramic and composite materials.

#### 06.05 DEMONSTRATE KNOWLEDGE OF PROTOTYPE DESIGN ENGINEERING PROCESSES--

The student will be able to:

1. Demonstrate the research and development process.
2. Describe the six stages in the design engineering process.
3. Defend the importance of working drawings in the manufacturing process.
4. Demonstrate the advantages of using computer aided drafting in the design

- stages of a product.
5. Design a mass production project for a class prototype.

06.06 DEMONSTRATE KNOWLEDGE OF TOOLS AND MACHINES USED IN MANUFACTURING SYSTEMS--

The student will be able to:

1. Demonstrate the proper use and practice of machines and tools used in a traditional manufacturing process (partial example - drill press, table saw, engine lathe, CNC, micrometer, caliper, scales and ruler).
2. Demonstrate the proper use and application of machines and tools used in an innovative manufacturing process (partial example - robotics, CAM, CIM, plasma, water jet, laser, sonic, fiber, optic, pneumatic and hydraulic).

06.07 DEMONSTRATE KNOWLEDGE OF THE FINANCES OF MANUFACTURING--

The student will be able to:

1. Conduct a market research on a given product.
2. Describe what is meant by "It takes money to make money".
3. List various methods of acquiring money for a manufacturing company.
4. Describe various costs associated with a manufacturing company.

06.08 DEMONSTRATE KNOWLEDGE OF PRODUCTION ENGINEERING PROCESSES--

The student will be able to:

1. Illustrate the three production processes of methods, manufacturing and quality control engineering.
2. Identify the importance of operations process charts, flow process charts and operations sheets.
3. Recognize the importance of tooling.
4. Operate and identify various gages used in the quality inspection process.
5. Define the terms "tooling up, pilot run, bottle neck, and debugging".

06.09 DEMONSTRATE KNOWLEDGE OF ORGANIZATION, OWNERSHIP, AND MANAGEMENT SYSTEMS--

The student will be able to:

1. Analyze the advantages and disadvantages of the five different types of ownership.
2. Explain the organization of a basic corporation and the expanding role of corporations worldwide.
3. List the four primary jobs of managers.
4. Identify the importance of the concepts behind total quality control in manufacturing.
5. Set up a corporation to sell a class project.

06.10 DEMONSTRATE KNOWLEDGE OF PROCESSING MATERIALS--

The student will be able to:

1. Demonstrate form-changing processes of materials.
2. Distinguish between primary and secondary production form-changing processes in the manufacturing system.
3. Analyze and demonstrate the difference between materials-forming, separating and combining processes.
4. Demonstrate materials testing techniques.

06.11 DEMONSTRATE KNOWLEDGE OF MARKETING PROCESSES--

The student will be able to:

1. Illustrate that marketing research as an input that helps to determine demand for a product.
2. Describe the characteristics of the consumer and industrial goods markets.
3. Identify the functions of marketing, including product planning, advertising, sales and product service.
4. Analyze the problems (ethics) related to marketing techniques.

06.12 DEMONSTRATE KNOWLEDGE OF FINANCIAL PROCESSES--

The student will be able to:

1. Interpret various methods of calculating a break-even analysis for a manufactured product.
2. Demonstrate the basic steps involved in keeping track of financial activities with a general ledger.
3. Illustrate the process of calculating payroll and the various payroll deductions.
4. List the components of a balance sheet for a manufacturing company.
5. Apply the means of reporting manufacturing profits and calculating dividends with an income statement.

06.13 DEMONSTRATE KNOWLEDGE OF MANUFACTURED GOODS--

The student will be able to:

1. Analyze why the availability of manufactured goods is one of the variables that determine standard of living.
2. Classify consumer goods as durable or nondurable.
3. Recognize the impact of goods on quality and length of human life.
4. Define the impacts and consequences of military goods, both conventional and nuclear.

06.14 DISCUSS THE RELATIONSHIP OF SCRAP, WASTE, POLLUTION, AND RECYCLABILITY--

The student will be able to:

1. Describe how mass production is followed by mass consumption, which is usually followed by mass scrap, waste, pollution and recyclability.
2. Explain why scrap is an output for one manufacturer and an input for another.
3. Identify pollution as a direct and indirect output of manufacturing.
4. Describe major air pollutants.
5. Report on groundwater contamination and toxic waste chemicals.
6. Identify the difficulties associated with solving non-point source pollution problems.
7. Illustrate the modern historical shift from air and water disposal to land disposal of toxic waste chemicals.
8. Evaluate products for appropriate use of materials.